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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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10/029,698

12/18/2001

Nicholas J. Heaton

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05/28/2004

SCHLUMBERGER OILFIELD SERVICES

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EXAMINER

VARGAS, DIXOMARA

ART UNIT

PAPER NUMBER

2859

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/029,698             | HEATON ET AL.       |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Dixomara Vargas        | 2859                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2002 and 14 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date, _____.   |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____.  | 6) <input type="checkbox"/> Other: _____.                                   |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-7, 9-15, 17-23, 25-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coates et al. (US 5,696,448 A) in view of Prammer et al. (US 5,936,405 A).

With respect to claims 1, 9 and 18, Coates discloses a method for determining a molecular property of each constituent in a mixture of hydrocarbons in a portion of earth formation surrounding a borehole comprising (Abstract): generating a static magnetic field in a portion of the earth formation surrounding a borehole; producing an RF magnetic field in the

portion of the earth formation (Column 5, lines 3-9); measuring NMR signals from the portion of the earth formation (Column 5, lines 52-67); deriving at least one dynamic parameter to each constituent in the mixture from NMR signals (Abstract) and calculating at least one molecular property for the mixture from the at least one dynamic parameter for each constituent (Column 14, lines 11-17).

In addition, Coats discloses the invention as stated above except for specifying the step wherein the molecular property calculated is selected from the list of molecular size distribution, molecular weight distribution and carbon number distribution. However, Prammer discloses the step of calculating molecular dynamics, for example, molecular size (Column 2, lines 13-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Prammer's teachings about the calculation of the molecular size with Coats's method for determining a molecular property of each constituent in a mixture of hydrocarbons in a portion of earth formation surrounding a borehole for the purpose of identifying the type of sample dependent on the measurement parameters of T1, T2 and diffusion.

4. With respect to claims 2, 10 and 19, Coates discloses generating a model that includes a plurality of components for the constituents of the mixture and iteratively modifying the model components to optimize the model with respect to the NMR data (Column 3, lines 21-23).
5. With respect to claims 3, 11 and 20, Coates discloses the dynamic parameter comprises one selected from a longitudinal relaxation time, a transverse relaxation time, a ratio of longitudinal and transverse relaxation times and diffusion rate (Column 3, lines 24-38).
6. With respect to claims 4 and 12, Coates discloses the mixture of hydrocarbons is disposed in a geological formation (Column 3, lines 16-20).

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7. With respect to claims 5, 13, 21 and 27, Coates discloses correlating the at least one dynamic parameter of the each constituent with effective viscosity of each constituent (Column 3, lines 16-20).

8. With respect to claims 6, 14, 22, 28 and 31, Coates discloses deriving empirical parameters from a suite of hydrocarbon samples (Column 3, lines 16-20).

9. With respect to claims 7, 15, 23 and 29, Coates discloses the suite of hydrocarbon samples comprises crude oils (Column 14, lines 11-17).

10. With respect to claims 17 and 25, Coates discloses using one tool selected from a wireline NMR tool, a logging while drilling NMR tool, and a modular formation dynamics tester or a laboratory NMR instrument (Figures 1-4).

11. With respect to claim 26, see rejection of claims 1 and 3 above in paragraphs 3 and 5.

12. Claims 8, 16, 24 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coates et al. (US 5,696,448 A) and Prammer et al. (US 5,936,405 A) in view of Tutunji et al. (US 6,337,568 B1).

With respect to claims 8, 16, 24 and 30, Coates and Prammer disclose the claimed invention as stated above in claims 1-7, 9-15, 17-23, 25-29 paragraphs 3-11 except for the step of using a neural network. However, Tutunji discloses the use of the neural network (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Tutunji's neural network with Coates and Prammer's NMR logging system for performing the method of determining the molecular property of the hydrocarbons for the

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purpose of further enhancing the resolution of a particular log measurement since it can be used to generate finer resolution data by the computer simulation that produces output based on available log measurements, human knowledge, and other factors.

### ***Response to Arguments***

13. Applicant's arguments with respect to claims 1-31 as amended under RCE have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

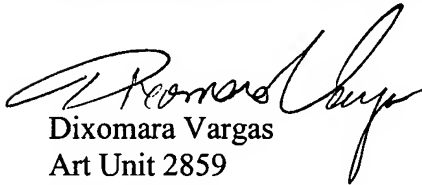
14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional prior art cited in the PTO 892 discloses MR systems with molecular properties been calculated.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (571) 272-2252. The examiner can normally be reached on 8:00 am. to 4:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Dixomara Vargas  
Art Unit 2859  
May 26, 2004



Diego Gutierrez  
Supervisory Patent Examiner  
Technology Center 2800